Carl G. Pfendner

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1. Research Focus

   Experimental ultrahigh energy astroparticle physics, cosmic rays, neutrinos, analysis and simulation, radio detection and antenna design, data science, big data projects, physics education

2. Professional Preparation

University of Wisconsin - Madison	Physics	Ph.D. (2012)
University of Wisconsin - Madison	Physics	M.A. (2008)
University of Cambridge	Philosophy of Religion	M.Phil. (2006)
University of Pennsylvania	Physics, Classical Studies	B.A. (2005)
Germantown Friends School		Diploma (2001)

   - University of Wisconsin - Madison - Thesis: *A Bayesian Analysis of the Pierre Auger Cosmic Ray Energy Spectrum from Different Regions of the Sky*, Advisor: Stefan Westerhoff
   - University of Cambridge - Thesis: *Proclus' "Dei" and Śankara's "Devatās": Intermediaries Between the One and the Many*, Advisor: Douglas Hedley

3. Appointments

   - Visiting Assistant Professor, Denison University, Granville, OH August 2019-Present
   - Visiting Assistant Professor, Otterbein University, Westerville, OH August 2018-July 2019
   - Lecturer, Ohio State University, Columbus, OH, January 2018-May 2018
   - Postdoctoral Researcher, Ohio State University, Columbus, OH, February 2012-August 2018
   - Research Assistant, University of Wisconsin-Madison, Madison, WI, 2007-2012
   - Teaching Assistant, University of Wisconsin-Madison, Madison, WI, 2006-2007

4. Teaching Experience

   Denison University

   - Spring 2021 - Physics 400 - Seminar (seminar course, 1 lecture section, scientific communication, talks, journal reading for Physics majors)
   - Spring 2021 - Astronomy 100 - Introduction to Astronomy (general astronomy course for non-scientists, 1 lecture section, 2 lab sections)
   - Fall 2020 - Astronomy 100 - Introduction to Astronomy (general astronomy course for non-scientists, 1 lecture section, 2 lab sections, hybrid model: 3/4 of students in-person, 1/4 remote)

- Fall 2020 - Physics 121 - Introductory Mechanics for Non-Physics-Majors (calculus based, 1 lecture section, 1 lab section, hybrid model: 2/3 of students in-person, 1/3 remote)
- Spring 2020 - Physics 122 - Introductory Electromagnetism for Non-Physics-Majors (calculus based, 2 lecture sections, 2 lab sections, partly remote due to transition to online learning for COVID-19 management)
- Fall 2019 - Physics 121 - Introductory Mechanics for Non-Physics-Majors (calculus based, 2 lecture sections, 2 lab sections)

Otterbein University

- Spring 2019 - Physics 1500 - Introductory Mechanics for Natural Scientists (calculus based, 1 lecture, 1 lab)
- Spring 2019 - Physics 1600 Lab - Introductory Electromagnetism for Natural Scientists (calculus based, 2 lab sections)
- Fall 2018 - Physics 1100 - Introductory Mechanics for non-physical scientists (non-calculus based, 1 lecture section, 3 lab sections)

Ohio State University

- Spring 2018 - Physics 1200 - Introductory Mechanics for (non-calculus based, 3 discussion sections, 3 lab sections)

5. Awards, Fellowships, Scholarships

- Wisconsin Alumni Research Foundation Fellowship, UW-Madison, 2006-2007
- Gates Cambridge Scholarship, University of Cambridge, 2005-2006
- Phi Beta Kappa, University of Pennsylvania, 2005
- Benjamin Franklin Scholar, University of Pennsylvania, 2001-2005

6. Notable Publications:

- "Constraints on the Diffuse Flux of Ultra-High Energy Neutrinos from Four Years of Askaryan Radio Array Data in Two Stations," Allison *et al.* (ARA Collaboration), Phys. Rev. D 102, 043021 (2020), arXiv:1912.00987.
- "Constraints on the Ultra-High Energy Neutrino Flux from Gamma-Ray Bursts from a Prototype Station of the Askaryan Radio Array," P. Allison *et al.* (ARA Collaboration), Astropart.Phys. 88 (2017) 7-16, arXiv:1507.00100v2.
- "Shape Analysis and Deployment of the ExaVolt Antenna," F. Baginski *et al.* (EVA collaboration), J. Astron. Instrum., 06 (2017) 1740004.
- "Performance of two Askaryan Radio Array stations and first results in the search for ultrahigh energy neutrinos," P. Allison *et al.* (ARA Collaboration), Phys. Rev., D93 (2016) no 8, 082003, arxiv:1404.5285.
- "First Constraints on the Ultra-High Energy Neutrino Flux from a Prototype Station of the Askaryan Radio Array," P. Allison *et al.* (ARA Collaboration), Astroparticle Physics, 70 (2015) 62-80, arxiv:1404.5285.

- "Observation of High-Energy Astrophysical Neutrinos in Three Years of IceCube Data," M.G. Aartsen *et al.* (IceCube collaboration), Phys. Rev. Lett. 113 (2014) 101101, arxiv:1405.5303.
- "Evidence for High-Energy Extraterrestrial Neutrinos at the IceCube Detector," M.G. Aartsen *et al.* (IceCube collaboration), Science **342**, 1242856 (2013) arxiv:1405.5303
- "A Bayesian Approach to Comparing Cosmic Ray Energy Spectra," S.Y. BenZvi, B. Connolly, C. Pfendner, and S. Westerhoff, Astrophys. J., **738**, 82 (2012).
- "Update on the correlation of the highest energy cosmic rays with nearby extragalactic matter," P. Abreu *et al.* [Pierre Auger Collaboration], Astropart. Phys. **34**, 314, (2010).
- "Measurement of the energy spectrum of cosmic rays above 10^{18} eV using the Pierre Auger Observatory," J. Abraham *et al.* [Pierre Auger Collaboration], Phys. Lett. **B685**, 239, (2010).
- "Anisotropy and chemical composition of ultra-high energy cosmic rays using arrival directions measured by the Pierre Auger Observatory," J. Abraham *et al.* [Pierre Auger Collaboration], J. Cosm. Astrop. Phys., **06**, 022, (2011).
- "Observed Limits on Charge Exchange Contributions to the Diffuse X-ray Background," S.G. Crowder *et al.*, Astroph. Journ., **758**, 143 (2012).

7. Affiliations

- Radio Neutrino Observatory (RNO) collaboration, 2018-present
- Genetically Evolving NEuTrIno TeleScopes (GENETIS) collaboration, 2018-present
- Askaryan Radio Array (ARA) collaboration, 2012-present
- ExaVolt Antenna (EVA) collaboration 2012-2018
- Antarctic Impulse Transient Antenna (ANITA) collaboration, 2012-2018
- IceCube collaboration, 2012-2013
- formerly Pierre Auger Observatory (PAO) collaboration, 2009-2012
- American Physical Society - member, 2009-present
- *Graduate Advisors and Postdoctoral Sponsors:*
  Postdoctoral supervisor: Amy Connolly, Ohio State University
  Ph.D. Thesis Advisor: Stefan Westerhoff, University of Wisconsin - Madison
  M.Phil. Thesis Advisor: Douglas Hedley, University of Cambridge

8. Student Research Supervised as Faculty

- Ongoing: Xinyi "Rose" Zhao, Denison University undergraduate researcher, semester independent research - "Improving antennas via evolutionary algorithms"
- Zhezheng Zhu, Denison University undergraduate researcher, Anderson Summer Scholars program - "Sensitivity on ARA Detector for UHE Neutrino Source Models," https://tinyurl.com/AndersonARASensitivity

9. Conference Talks and Posters

- "Preliminary Analysis from a 4-Year Search for a Diffuse Flux of Neutrinos from the Askaryan Radio Array", C.Pfendner for the ARA Collaboration, APS April Meeting 2018, Columbus, OH, USA, April 2018.

- "Progress in In Situ UHE Neutrino Detectors: Joint Studies on Simulation and Ice", C.Pfendner for the ARA and ARIANNA Collaborations, TeVPA 2017, Columbus, OH, USA, August 2017.
- "Background rejection in the ARA experiment", C. Pfendner for the ARA Collaboration, ARENA 2016 conference talk, Groningen, NL, September 2016.
- "The ExaVolt Antenna: Concept and Development Updates", C. Pfendner for the EVA Collaboration, ARENA 2016 conference talk, Groningen, NL, September 2016.
- "First cosmogenic neutrino limits from the ARA Testbed station at South Pole", C. Pfendner, A. Connolly, E. Hong, D. Besson, J. Davies for the ARA Collaboration, ICRC 2015 conference poster, The Hague, NL, August 2015.
- "First cosmogenic neutrino limits from two full ARA detector stations at South Pole", A. ÓMurchadha, T. Meures, C. Pfendner, for the ARA Collaboration, ICRC 2015 conference poster, The Hague, NL, August 2015.
- "The ExaVolt Antenna: Mission Concept and Technology Developments", C. Pfendner, A. Romero-Wolf for the EVA Collaboration, ICRC 2015 conference, The Hague, NL, August 2015.
- "The Askaryan Radio Array: Status and Updates", C. Pfendner for the ARA Collaboration, ARENA 2014 conference, Annapolis, MD, USA, June 2014.
- "Ultra-High Energy Neutrino Radio Frequency Detectors", C. Pfendner, Astroparticle Physics (TevPa/IDM) 2014 conference, Amsterdam, Netherlands, June 2014.
- "The ExaVolt Antenna", C. Pfendner, A. Connolly for the EVA Collaboration, Rio de Janeiro, Brazil, 6 July 2013, Parallel session NU-IN
- "ARA TestBed background data analysis and neutrino sensitivity limit study", C. Pfendner for the ARA Collaboration, Rio de Janeiro, Brazil, 7 July 2013, Poster session NU-IN
- "ARA TestBed background data analysis and neutrino Sensitivity limit Study", E. Hong, A Connolly, C. Pfendner, April meeting of the APS, Denver, Colorado, April 2013, Session G8.00007.
- "Small-Scale Clustering of Ultrahigh Energy Cosmic Rays at the Pierre Auger Observatory", C. Pfendner, April meeting of the APS, Denver, Colorado, April 2009, Session H8.00002.

10. Workshops

- Ohio State University Center for Cosmology and Astroparticle Physics (CCAPP) - Computing in High-Energy AstroParticle Research (CHEAPR 2016), August 2016 - organizer, talk given "The Askaryan Radio Array: A Radio-Based Ultrahigh Energy Neutrino Detector at the South Pole"
- University of Chicago Kavli Institute for Cosmological Physics (KICP) - Next-Generation Techniques for UHE Astroparticle Physics (UHEAP), February 29 - March 2 2016 - talk given "The ExaVolt Antenna: Concept and Development Updates"
- Ohio State University Center for Cosmology and Astroparticle Physics (CCAPP) - Making Sense of the Ultra-High-Energy Sky Workshop, April 2015 - talk given: "The Askaryan Radio Array: Status, Results, and Prospects of a UHE Neutrino Detector"

- Joint Space Science Institute (JSI) Multi-messenger and PeV Neutrinos Workshop, Annapolis, MD, November 10, 2014, talk given: "First Neutrino Search Results from the Askaryan Radio Array".
- CCAPP - Cosmic Messages in Ghostly Bottles: Astrophysical Neutrino Sources and Identification, February 2014 - talk given: "UHE Neutrino Radio Detectors"
- CCAPP - Interferometric Techniques for Impulsive Signals at Radio/Microwave Frequencies, February 2013 - talk given: "Radio Interferometry with the ARA detector"
- CCAPP - Radio Simulations for Neutrino and Cosmic Ray Detectors, February 2012- participant

11. Seminars and Colloquia

- University of Alabama Colloquium - "Ultrahigh Energy Neutrinos: Cosmic Ghosts and How to Bust Them" - March 1, 2017
- Michigan Technological University - December 15, 2011
- Ohio State University CCAPP Seminar - December 13, 2011

12. Other activities

- Granville elementary second-grade science field trip planetarium presenter, February 2019.
- Ohio State University Center for Cosmology and Astroparticle Physics (CCAPP)
  - ASPIRE outreach workshop - preparation and volunteer assistant - June 2014, August 2015, April 2016, June 2017.
  - Breakfast of Science Champions outreach event - organizer - February, November 2014, November 2015.
  - Summer seminar series - organizer - 2013, 2014, 2015, 2016
- Teaching Assistant's Association, AFT Local 3220, Madison, WI, 2007-2010 - Bargaining team member (2007-2010), Steward (2006-2007)
- BILAP (Buddhism in Logic and Analytic Philosophy) conference - student organizer, Cambridge, UK, 2005